

Life Sciences Seminar

From individual motion to collective cell migration

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Collective cell migration is fundamental throughout development, during wound healing and in many diseases. Although much effort has focused on cell-cell junctions, a role for matrix stiffness and physical confinement in epithelial cell migration remains unclear. To address these open questions, we studied first the migration of highly motile keratocytes on culture substrates with similar biochemical properties and a wide range of rigidities (from kPa to GPa). We show a matrix rigidity-dependent regulation of the directional persistence in motile keratocytes and our findings refine the role of ?v?3 and ?5?1 integrins in the molecular clutch model. Then, we used adhesive microstripes of varying widths to mimic the spatial confinement experienced by follower cells within epithelial tissues. Our findings show a direct correlation between the migration velocity of confined cells and their cell-substrate adhesive area. Closer examination revealed that adhesive area confinement reduces lamellipodial protrusive forces, decreases the number of focal complexes at the leading edge and prevents the maturation of focal adhesions at the trailing edge, together leading to less effective forward propelling forces. These findings demonstrate that epithelial confinement alone can induce follower-like behaviours and identify substrate adhesive area confinement as a key determinant of cell velocity in collective migration. Finally, we will introduce recent experiments that use well-defined trains of epithelial cells to decipher the role of axial and lateral adhesive interactions in collective migration of epithelial cells. These results suggest that the establishment of lateral adhesive interactions lead to a drop of the cell migration velocity, whereas axial adhesive interactions do not affect the migration speed of epithelial cohorts.

Wednesday, January 29, 2020 11:30am - 12:30pm
Mondi Seminar Room 3, Central Building



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